

BeAGLE paper thoughts

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- Debugging
- Pythia Parameters
 - Other

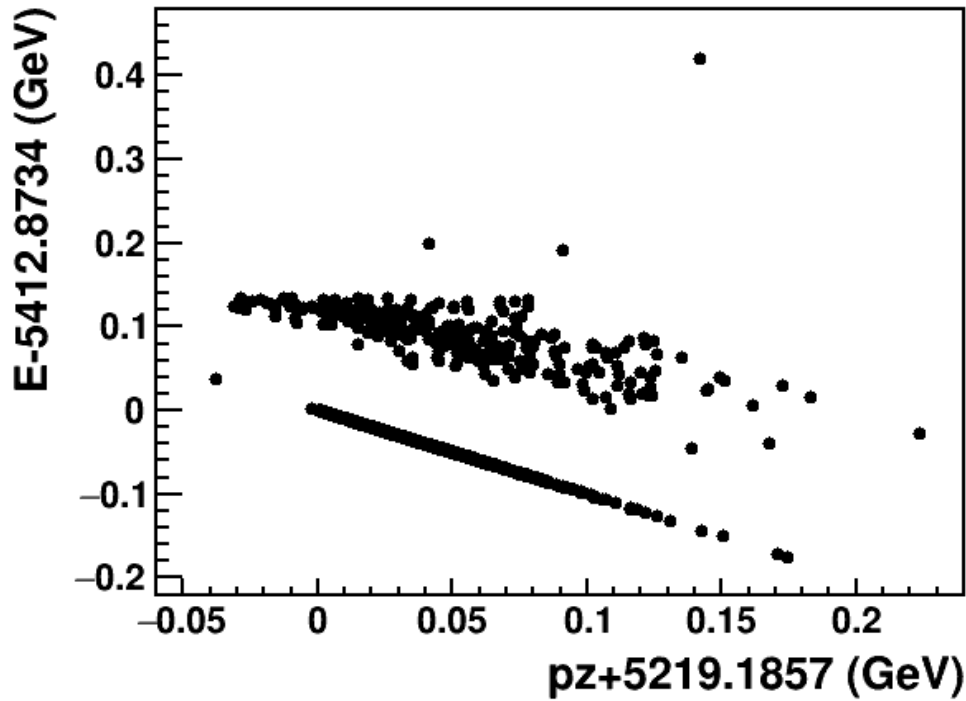
BeAGLE technical issues

- Finish debugging. Goals (making progress):
 - Fixed target and collider $e+A$ at the same s should be the same.
 - Fraction of rerolled events
 - Distributions: E^* , N_{nevap} etc.
 - **FIXED:** Initialize FLUKA before initializing DPMJET (using EXMSAZ() for mass calculation).
 - If you call EXMSAZ before initializing FLUKA, EXMSAZ works fine, but it changes after the initialization!
- 4-momentum conservation
 - Subtle bugs in IntraNuclear Cascade

Remaining Total 4-momentum Errors

(18x135 equiv.)

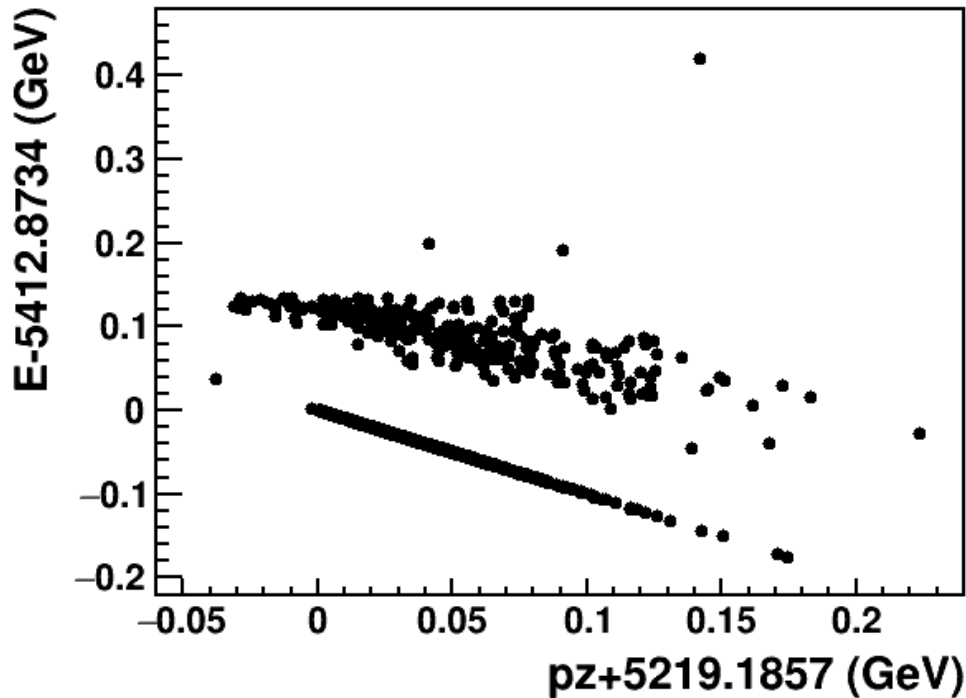
e+Pb 5219.1857 FT J/ ψ diff (DIS similar)



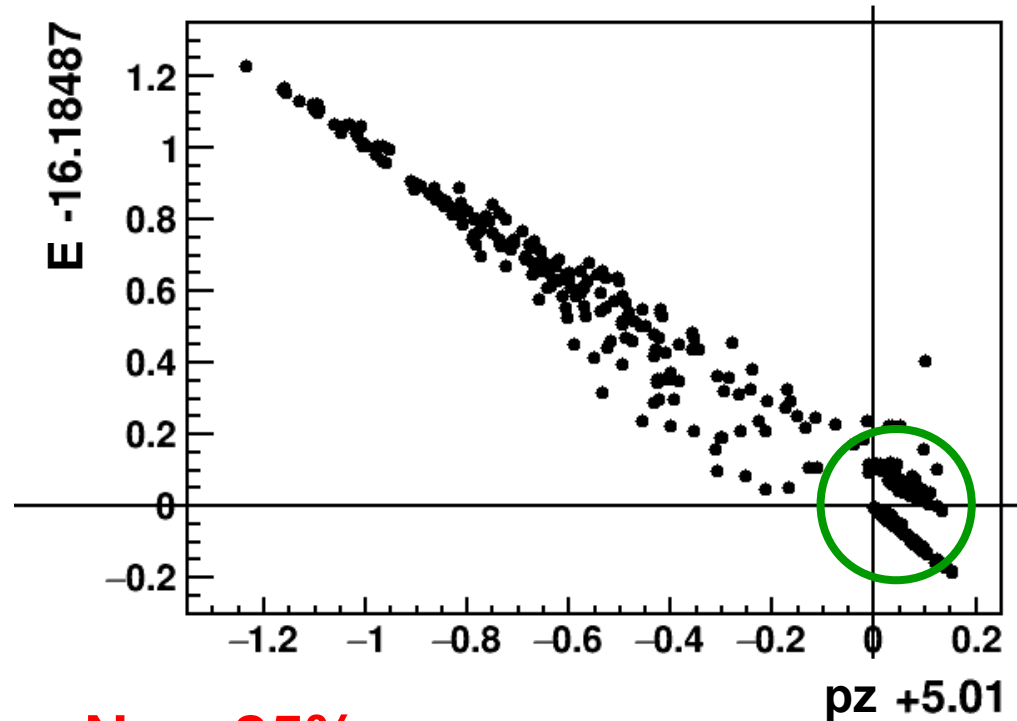
100s of particles
Error of 0.004% (38ppm)
Hard to debug...

Remaining Total 4-momentum Errors

e+Pb 5219.1857 FT J/ ψ diff



e+C 5.01 FT DIS



**New 25%
error for
low energy
(JLAB issue)**

**Fewer particles
Error of 3% in pz**

Basic eRHIC/HERMES Pythia tune to start

We use PARP(99)=0.4 (resolved photon kT D=1.0),
MSTJ(12)=1 (no popcorn)
MSTP(19)=1, MSTP(20)=0 low Q² behavior
PARP(161)=3.0, PARP(162)=24.6, PARP(163)=18.8, vector coup.
PARP(165)= 0.47679,
PARP(2)=2.0, CKIN(1)=1.0. lower energy

ALSO:

CKIN(65)=1e-09 (min. Q²)
MSTP(81)=0 Multiple interactions off
MSTP(82)=1 Needed for correct handling of resolved processes
MSTP(38)=4 Nf for (rare) box diagrams

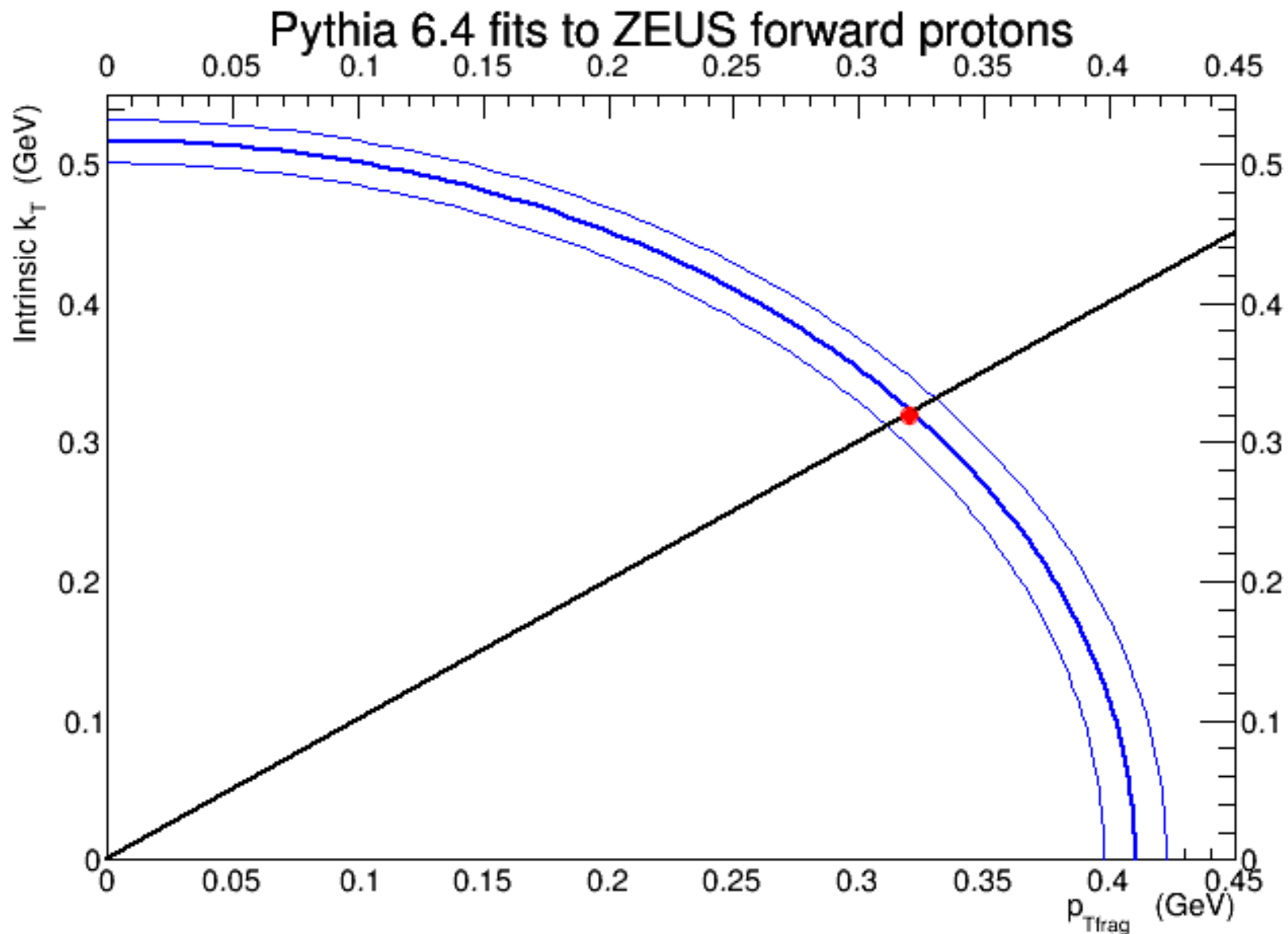
PDF and α_s

- EPS09LO drives the ep PDF to be:
 - **MSTP(52)=2, MSTP(51)=10041 (CTEQ6L1)**
- Then we want a roughly consistent α_s
 - **MSTU(113)=5 (force 5-flavor α_s for all Q^2)**
 - The formulas in JETSET & CTEQ are not 100% consistent, and Elke & I concluded that this was the best choice for matching.

Pythia tune for ZEUS e+p

- PARP(91) & PARJ(21) are the main parameters which affect ZEUS forward protons $\langle p_T^2 \rangle$ vs. x_L for $x_L > 0.3$ ($x_F < -0.3$).
 - Tradeoff between them. Can set **PARP(91)=PARJ(21)=0.32** or can set PARP(91)~0 and PARJ closer to default.
 - MANY parameters affect pT distribution for $x_F > 0$.
- MSTP(94), PARP(97) are the main parameters which affect ZEUS forward n & p x_L distribution.
 - **For MSTP(94)=2: PARP(97)~6 works.**
 - Protons prefer higher, neutrons lower. Compromise.

Old estimate of good parameter range



Other issues for me

- Back on the clock for JLAB as well as BNL.
- JLAB project is NOT EIC, but BeAGLE for JLAB $e+A$ FT (6 & 12).
- eRD17 written report due Jan. 3, 2020 (F+2wks).
- ERD17 meeting Th-F Jan. 30-31
- **RAPGAP very overdue.**